Testing the altruism hypothesis with italian cohort data

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TESTING THE ALTRUISM HYPOTHESIS WITH ITALIAN COHORT DATA

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In this paper I follow Abel and Kotlikoff 1994 non-parametric approach based on consumption cohort data to test for intergenerational altruism among Italian households. The Italian socio-economic framework represents an interesting ground to test for the Barro's 1974 model given the stronger family linkages usually present among Italian households. All tests reject altruism. Further, I evaluate how restrictive is the assumption of a zero correlation between the clan's Euler errors and the demographic structure of the clan. I find no evidence of any major role played by the age composition of the clan and conclude that the zero correlation assumption is reasonable.

1. INTRODUCTION

An open question in the literature of fiscal policy concerns the effect of deficits and government redistribution policies on the economy. Previous studies have stressed the fact that the effectiveness of any fiscal policy very much depend on the response of the agents to the policy itself. This is because any redistribution policy (as changes in the stock of government debt, unfunded social security, any fiscal policy involving changes in the relative amounts of tax and debt finance for a given amount of public expenditure) implicitly determines a transfer of resources across current and/or future generations. The response of the affected households to such a transfer crucially affect the ability of the government to influence the economic outcomes.

Some authors (Modigliani 1961; Mundell 1971, Tobin 1971) have argued that an increase in the stock of public debt leads, at least in part, to an increase in the typical household's conception of its net wealth. This assumption is crucial in demonstrating a positive (wealth) effect on aggregate demand of an "expansionary" fiscal policy. These authors also recognize that the future taxes needed to finance government interests payments would partially offset the positive wealth effect, but the offsetting degree will never be full.

In 1974 Robert Barro developed an ingenious model of intergenerational altruism. The model starts with the simple assumption that parents care about the welfare of their children. If this assumption can be extended to the limit of a systematic operative chain of intergenerational transfers, then Barro shows that current generations act effectively as though they were infinite-lived.[1] Barro's model then leads to the remarkably striking conclusion that, apart from distorting marginal incentives, deficits, unfunded social security and all other government redistributions will have no net-wealth effect on aggregate demand, interest rates and capital formation.

[1] Systematic operative chain of intergenerational transfers means here the existence of an interior solution for the amount of bequest from parents to sons or gifts from sons to parents. In other words, for the Barro's altruism hypothesis to work, we require an always positive amount of transfers from parents to sons or from sons to parents in every period. These transfers are supposed to perfectly smooth the consumption levels of parents and children according to the solution of the dynastic utility maximization problem.

Barro's altruism hypothesis has received considerable attention in the literature on fiscal policy. However, the results of empirical tests on the Barro's model usually tend to reject such altruistic assumption. In particular, many tests have been performed in the past on the behavior of US households, but there is no relevant evidence concerning different countries. The present paper investigates the age-cohort paths of consumption in Italy from 1987 to 2002 in order to test the *inter-generational altruism model* developed by Barro. Italy provides an interesting case to assess the effectiveness of government redistribution based upon a recent stream of major changes in the fiscal policy. During the last decade the Italian government has put in place two big pension reforms and a process of fiscal consolidation in order to participate, since the beginning, to the introduction of the Euro. As well established in the literature, the analysis of the social security reforms and of the deficit reductions are to be analyzed by taking into account the appropriate households response to such changes. Therefore, a test on households behavior seems a necessary first step towards a deeper analysis.

Abel and Kotlikoff (1994) showed that a testable implication of the Barro's model is the so-called *equal Euler errors proposition*. Under the assumption of homothetic and time separable preferences if households are altruistically linked across generations via a chain of operative transfers, then the Euler errors must be identical across households belonging to the same clan. If one assumes that all clans have the same age-structure or that the age-structure of the clans is not correlated to their Euler errors, then it is possible to derive a simple prediction of the Barro's model to be tested by using cohort data. The main goal of this paper is to test this prediction by using Italian cohort data. The rationale for using cohort data derives from several difficulties related to alternative strategies. Usually, at a micro level the lack of data on consumption and income of altruistically linked households and the difficulty to determine which households belong to a given clan represent a major obstacle. Altonji, Hayashi and Kotlikoff (1992) proposed a direct test of altruism using micro data contained in the Panel Study of Income Dynamics (PSID). Unfortunately, such data are not available in Italy. On the other hand, the main disadvantage of using macro data usually refers to the aggregation of different clans, each of which can have a different utility function. In this perspective, the advantage of using cohort data is that no parametric assumption is requested on households' preferences. The only necessary restriction is that households preferences have to be homothetic and time separable. Under this assumption, the Euler error in the first order condition of each household 's maximization problem represents its percentage change in consumption. By applying the equal errors proposition, it follows that the percentage change in consumption of each member of a clan should be the same at a given point in time. This also implies that the average percentage change in consumption of each age-cohort should be the same in each period. This result gives us a simple prediction of the Barro's model and do not require any parametric assumption on households preferences beyond homotheticity and time separability. To my knowledge, this is the first attempt to use cohort data to test the altruism hypothesis using Italian data.

In the paper I propose two different strategies to test the model. The first one is based on the comparison across time of the age-consumption profiles. The second one looks at the significance of changes in income to explain changes in consumption. The main finding of the paper is a clear rejection of the altruism hypothesis for the Italian sample[2]. In particular, I observe a relevant shift in the age-consumption profiles and I find that changes in income can largely explain changes in consumption over time periods. Both findings point to the conclusion that Italian households are not inter-generationally linked in the Barro's sense.

The paper wants also to shed light on the relevance of the assumption made to derive the testable implication of the equal Euler errors proposition, i.e. clans have the same age-structure or the age-structure of the clans is not correlated to the Euler errors of the clan itself. In principle, if clans have a different age-structure, the aggregation of consumption at age-cohort level might lead to different average Euler errors across age-cohorts. In this case we reject the altruism hypothesis even though households are behaving *a la* Barro. In order to test for this *age-structure effect*, I test altruism on different sub-samples, which have different age-structures. By comparing the results obtained in the whole sample with those obtained in the sub-samples, I can determine whether an *age-structure effect* is important. I find no evidence of any relevant effect. However, this testing strategy suffers the standard limitation due to the lack of detailed information on the composition of the clans in the different sub-samples and do not allow further investigation. Therefore, if the absence of an age-structure effect is taken as the null hypothesis, the present study can neither reject it nor accept it.

2. The Equal Euler Errors Proposition

In this section I derive a result for the percentage change in consumption of altruistically linked households based on the Barro's model. The aggregation of this result by age-cohorts provides a simple relationship to test the intergenerational altruism model against the life-cycle hypothesis. A detailed proof of the equal Euler errors proposition can be found in Abel and Kotlikoff (1994), who first showed the result. Here an intuition for the result and a sketch of the derivation are provided for convenience. The interested reader might refer to Abel and Kotlikoff for a more complete description.

In the Barro's model the clan utility function depends on the consumption of present and future generations within the clan. Therefore, the clan wants to maximize the present discounted value of current and future utility levels. The clan intertemporal maximization problem is solved in two steps. First, at each period in time, the clan has to allocate consumption to each household belonging to the clan itself.[3] The decision will be a function of the common resources available and the weights attached to the utility of each household in the clan.[4] In the present formulation households have no bargaining power over the determination of the clan sharing rule. [INSERT REFERENCES]. However, even in the presence of households' bargaining power, the proposition would still hold as long as common sharing of resources applies. Once the clan decision is made, each

[2] Abel and Kotlikoff (1994) obtained the same result by using US data.
[3] One might think to the "clan" as a central planner of a group of altruistically linked households
[4] The weights are simply a function of the composition and age-structure of a given household. This implies that a clan weights households' utility based on the age of the actual consumer.

household allocates consumption to each member by taking the total household's consumption as given.[5]

The only required assumption to show the equal errors proposition is that the (clan) intertemporal utility function be homothetic and time separable. This also implies that the households' intratemporal utility function is isoelastic.

For the isoelastic utility function, each household's maximization subject to a given total household consumption yields

$$U_{i,t,k} = \phi_{i,k,t} \frac{C_{i,k,t}^{1-\gamma_i}}{(1-\gamma_i)} \tag{1}$$

where $U_{i,k,t}$ is the utility level of household *k* in clan *i* at time *t*; $C_{i,k,t}$ is total household consumption; $\phi_{i,k,t}$ is a function of the two sets of variables, namely the numbers of members in each age-cohort and the weights that the household places on each member's consumption which also varies with age. In other words, given the isoelastic assumption, each household's utility level is simply a function of total household consumption at time *t*. The clan maximizes the discounted sum of its households' current and future intratemporal utilities. Let δ_i be the time preference discount factor for all households in clan *i*, and let $N_{i,s}$ denote the number of households in clan *i* at time *s*. At time t, the clan maximizes:

$$V_{i,t} = E_t \sum_{s=t}^{\infty} \delta_i^{s-t} \sum_{h=1}^{N_{i,s}} \phi_{i,h,s} \frac{C_{i,h,s}^{1-\gamma_i}}{(1-\gamma_i)} \tag{2}$$

under the following common resources constraint:

$$W_{i,t+1} = \left(W_{i,t} + \omega_{i,t} - C_{i,t} - G_t\right)\left(1 + r_{i,t}\right) \tag{3}$$

where

$$C_{i,t} = \sum_{h=1}^{N_{i,t}} C_{i,h,t}$$

is the total consumption of clan *i* at time *t*. The term $\omega_{i,t}$ stands for the labor income of the clan at time *t*; $r_{i,t}$ is the rate of return on nonhuman wealth earned by clan I at time t; and $W_{i,t}$ is the clan's net nonhuman wealth at time *t*. Notice that the labor income and the

[5] The proof of the proposition actually goes from the second to the first step. One would first derive the optimal allocation of consumption *within* each household by taking total household consumption as given. This yields the intratemporal household utility function. The intertemporal utility function of a clan is then obtained as the sum of the intratemporal utility functions across all households and across the present and future periods of time. The clan maximizes then the intertemporal utility function under the common resources constraint given its time preference.

rate of return in equation (3) can be uncertain without altering the result. Moreover, because of life span uncertainty and uncertainty about clan fertility, $\phi_{i,k,t}$ in equation (2) can be uncertain as well. The term G_t in equation (3) stands for government consumption at time *t*. Notice that which clan members are actually paying for the government spending does not affect the clan's budget constraint. This is because of the full sharing assumption: the clan will automatically offsets any redistribution by the government via its own redistribution. Therefore, a result of the Barro's model is the neutrality of fiscal policies: fiscal policies have no effect in redistributing resources across different age-cohorts and different generations.

The maximization of equation (2) subject to equation (3) implies two sets of first order conditions. The intratemporal first order conditions

$$\phi_{i,k,t}C_{i,k,t}^{-\gamma_i} = \phi_{i,h,t}C_{i,h,t}^{-\gamma_i} \qquad \forall k,h \tag{4}$$

determine the allocation of consumption at time *t* among the different households in the clan, while the intertemporal first order conditions

$$E_t\left[\delta_i\phi_{i,k,t+1}C_{i,k,t+1}^{-\gamma_i}(1+r_{i,t+1})\right] = \phi_{i,k,t}C_{i,k,t}^{-\gamma_i} \qquad \forall k \tag{5}$$

define a rule to allocate consumption of each given household over time. Let $\varepsilon_{i,k,t+1}$ denote the Euler error at time *t+1* for household *k* in clan *i*. The Euler error is defined as

$$\delta_i\phi_{i,k,t+1}C_{i,k,t+1}^{-\gamma_i}(1+r_{i,t+1}) = E_t\left[\delta_i\phi_{i,k,t+1}C_{i,k,t+1}^{-\gamma_i}(1+r_{i,t+1})\right]*\varepsilon_{i,k,t+1} \tag{6}$$

where $E_t\varepsilon_{i,k,t+1} = 1$. Using definition (6) into equation (5) we obtain

$$\left[\delta_i\phi_{i,k,t+1}C_{i,k,t+1}^{-\gamma_i}(1+r_{i,t+1})\right] = \phi_{i,k,t}C_{i,k,t}^{-\gamma_i}*\varepsilon_{i,k,t+1} \tag{7}$$

Equations (4) and (7) together implies that the Euler errors of all households in clan *i* are identical,

$$\varepsilon_{i,k,t+1} = \varepsilon_{i,h,t+1} \equiv \varepsilon_{i,t+1} \tag{8}$$

Notice that this result holds regardless of the age composition of each household in the clan and of the weights each household has in the clan utility function.

3. Aggregation in Cohort Data

In order to use this important implication of the Barro's model to perform a test of altruism with cohort data, some aggregation is necessary. First, take logarithms of equation (7)

$$\log\left(C_{i,k,t+1}/C_{i,k,t}\right)=(1/\gamma_i)*\log\left(\delta_i\phi_{i,k,t+1}/\phi_{i,k,t}\right)-\log\left[\varepsilon_{i,t+1}/(1+r_{i,t+1})\right] \tag{9}$$

Consider now all households in clan *i* whose heads are age *a* and take the average of equation (9) over all such households,

$$\Upsilon^a_{i,t+1}=\psi^a_{i,t+1}+\mu_{i,t+1} \tag{10}$$

Notice that the first term on the right hand side depends on both age and time, while the second one depends only on time because of the equal errors proposition. Next average equation (10) over all clans,

$$\sum_{i=1}^{M}s^a_{i,t}\Upsilon^a_{i,t}=\sum_{i=1}^{M}s^a_{i,t}\psi^a_{i,t}+\sum_{i=1}^{M}\mu_{i,t}/M+\sum_{i=1}^{M}s^a_{i,t}\left(\mu_{i,t}-\sum_{j=1}^{M}\mu_{j,t}/M\right) \tag{11}$$

In equation (11), $s^a_{i,t}$ is the fraction of age *a* households that belongs to clan *i* at time *t* and *M* is the total number of clans. The cohort average of the term $\mu_{i,t}$ has been decomposed into the simple average of the Euler errors (second term in the right hand side) plus the cohort weighted average value of the deviation of the clan's errors from the unweighted average error over all clans. The third term in equation (11) represents a measure of the covariance between a clan's Euler errors and its share of the population in the age group. In other words, this term explain how important is the age-structure of the clan in explaining its Euler errors. Abel and Kotlikoff (1994) assume that this term is zero. At first I borrow this assumption to perform the test with Italian data. After this I shall check the relevance of this assumption to analyze whether an age-structure effect can be considered relevant to the purpose of the testing strategy. In principle, the best way to test for an age-structure effect is to directly observe the behavior of households inside a given clan. The lack of detailed information on the composition of the clans is a standard limitation of this literature. Therefore, my strategy will go as follows. I divide the whole sample into sub-samples which are characterized by different age-structure. By comparing the results obtained in the whole sample with those obtained in the sub-samples, I can determine whether an *age-structure effect* is important for the Italian case. If the third term in equation (11) is zero, then we can re-write the equation as,

$$\overline{\Upsilon}^a_t=\overline{\psi}^a_t+\overline{\mu}_t \tag{12}$$

where the left hand side is the average percentage change in consumption for each cohort at each time period. The term $\overline{\psi}^a_t$ depends on both age and time and incorporates clans' preference over the age-distribution of resources. Since I consider a 15 years time period, in the term $\overline{\psi}^a_t$ I can drop the time subscript because preferences are not likely to change often. The term $\overline{\mu}_t$ is just a function of time and independent of age. It controls for common resources shocks at clan level.

$$\overline{\Upsilon}_t^a = \overline{\psi}^a + \overline{\mu}_t \quad (13)$$

Equation (13) is the basis of the test performed here. The Barro's inter-generational altruism model predicts that if clan's preferences are homothetic and time-separable and if the age-structure of the clan is not correlated with the Euler errors, then cohort percentage changes in consumption should only be a function of an age dummy and a time dummy. In the decision of how to change consumption of an age-cohort among two periods, the only things that matter are the clan preference on that cohort consumption and the common current and future resources of the clan itself.

4. THE DATA

The Bank of Italy's "Survey on Household Income and Wealth" (SHIW) is a repeated cross-sectional survey first conducted in 1965. It was carried out annually until 1987 (except for 1985) and every two years until 2002. The only exception refers to the survey of 1998 which was produced three years after the 1995 one.

The number of interviews in each survey may vary over time depending on the response rate. The reputation of the Bank of Italy is an argument used to elicit co-operation, but the response rate ranges around 60 percent. On average, each survey covers approximately 8,000 households and 20,000 people.[6] From 1987, the survey contains a panel component. Currently, about half of the sample (4,000 household in all) is included in the panel.

The dataset used in the present paper consists of all the surveys from 1987 to 2002. This implies the availability of eight time periods in the analysis of the consumption levels and seven time periods for the analysis of the percentage changes in consumption (i.e. the direct test of the equal errors proposition). The changes in consumption contained in the dataset are all biannual percentage variations computed as the log of the ratio of two following years. The only exception is a three years variation for the period 1995 – 1998. The use of biannual variations for testing the Equal Euler Errors proposition seems more appropriate than quarterly or semi-annual variations. In fact, a biannual change in consumption is less likely to reflect quite lumpy expenditures. The choice of excluding the surveys prior to 1987 is due to different reasons. First, the absence of a panel component before 1987 would have implied the use of two different datasets: one for the analysis of the levels (which does not require a panel component) and a smaller one for the test of the Equal Euler Errors proposition (which requires a panel component). It has been preferred to have the same dataset for all the different analyses.[7] Second, the dataset adopted already contains enough information and allows the study of the current situation. Going backward to the sixties and the seventies would have required additional work to compare very different economic environments.

The SHIW collects detailed information on socio – demographic conditions (area of residence, age, number of children and dependants, etc), employment status, incomes

[6] The number of households tends to be slightly higher in the late 80s and the early 90s. However, the gap is quite marginal.

[7] Extending the analysis of the levels to the years prior to 1987 will be part of future research.

(divided by source: labor, capital, transfers, pensions), consumption levels for durable and non-durable goods, wealth and financial activities. The questionnaires can also be used to obtain information on food expenditure of each household from 1987 on. The information about incomes are all net of taxes. The survey units are households. All household members are asked to report all their sources of income and all their expenditures in the year before the survey. The household income and consumption are then computed by aggregation.

The definition of aggregate household consumption used in this paper is total consumption expenditures excluding expenditures on durable goods. The SHIW collects also information on imputed rents (and non-monetary transfers) and these are included in the definition of consumption adopted in this paper. The definition of aggregate household income includes all incomes by any sources, including capital income.

The paper focuses on 45 age cohorts corresponding to ages 30 to 75. The analysis does not cover the age cohorts younger than 30 because of a sample selection problem. Usually, young people in Italy leave their family when they are quite mature and they are able to earn a relatively high income. Therefore, when we observe an head of household in the data younger than 30, it is very likely that he/she was relatively rich compared to the average who is still living with the family. Preliminary analysis on this issue confirmed the existence of such a problem.

The SHIW provides also sampling weights in each year for each household interviewed. These weights depend on the age of the head of household and the socio – demographic distribution of the Italian population in the year of the survey. The use of these weights is recommended when computing cohort averages in longitudinal analyses. This is the case of this paper. However, weights change from one year to another. This is a problem if one has to compute cohort average changes in consumption as it is the case of this paper. To handle this issue, two approaches have been adopted in the paper: 1) compute the *cohort simple average change* without weights; 2) use the sample weights of the survey of the second year in each pair. The results do not vary significantly and therefore only results for the cohort simple average changes are reported here.

5. Testing Strategies

In the paper I follow two separate testing strategies, one based on cohort average consumption levels and the other one based on cohort average consumption changes across time periods.

5.1 Age-consumption profiles

As a prelude to test the equal Euler errors proposition, it is of interest to preliminarily analyze the cohort-consumption paths in Italy from 1987 to 2002. While the prediction of the Barro’s model only concerns cohort variations in consumption, this approach is in levels and the results cannot be taken as a conclusive evidence either against or in favor of altruism. The analysis of levels basically ignores demographic effects, but if these are not dramatically relevant as it seems in the case of Italy, then this analysis can provide some important insights. In this perspective, two reasons support the implementation of this preliminary investigation. First, it is a useful way to obtain some information about the consumption behavior of different age-cohort over time. Second, movements in the cohort-consumption profiles might suggest intuitions about the effect of recent fiscal policies adopted in Italy. The equal Euler errors proposition derived by Abel and Kotlikoff (1994) implies that if one ignores demographic changes and measurement errors, then the age-consumption profile should be time-invariant and the shape of the profiles should be preserved.[8] In order to test for this prediction, one should ideally use data on consumption of each individual and aggregate them across cohorts. The altruistic model, in fact, suggests that the consumption of each person is the result of the allocation of the common resources at the clan level. Given the current lack of detailed data for Italy, an approximation is necessary.[9] The first approximation proposed here imputes the consumption expenditure to the head of household and ignores other household members. In this approach two households with the same age of the head are observationally similar (and are grouped together when computing average cohort consumption) regardless of the other members' age. Notice that the bigger the clan size in the society, the better it is the degree of approximation in this strategy.[10]

The age consumption profiles by head of households are reported in Figures 1 and 2. In order to construct Figure 1, I computed the weighted averages of annual consumption by age-cohort for each time period in the sample. In computing the weighted average I used the sample weights provided by the survey (SHIW). All the data are in 1985 Lira terms. Next I divided the average annual consumption of each age-cohort by the annual average consumption of 40 years old households. This strategy allows to put aside *national income effects*; i.e. movements of the age-consumption profile that can be the consequence of an overall increase in national resources due to a period of rapid growth. Once each cohort consumption is normalized to a reference consumption level, then a change in the shape of the profiles would only imply redistribution across generations, so contradicting the altruism hypothesis. Finally, I smoothed these relative cohort-average consumption levels by regressing them against an intercept and a fourth order polynomial in age. The R-squared in these regressions always exceeds 0.85. Regressing against a third order polynomial would yield a much lower R-squared (about ten percentage points lower), while using a fifth order polynomial would not increase significantly the R-square. Figure 2 is obtained in the same way of Figure 1. The only difference is that the eight time periods have been grouped in pairs. The values reported in Figure 2 are a simple (non weighted) average of the relative cohort-specific consumption levels in the

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[8] The implication is straightforward. The equal error proposition and the aggregation in cohorts showed that each age-cohort should vary consumption over time by the same percentage amount. By controlling for overall changes in consumption (as it is explained later), then the same percentage changes implies the same shape and the same slope in the age-consumption profiles. Of course, this is true only if there are no changes in the relative proportion of each age cohort in the population, i.e. no big demographic changes.

[9] No dataset contains information about the real consumption of each person in the sample. Usually, consumption data are reported per household. However, if the dataset contains information about what kind of consumption goods have been purchased by the household, one could impute consumption to each member according to their age and sex at a good level of approximation. The Bank of Italy SHIW does not provide these information.

[10] Kotlikoff (1989) and Bernheim and Bagwell (1988) argued that clans may be quite large because of current and potential inter-marriage.

two time periods grouped together. An alternative approach would have required the use of the sample weights of one of the two years. [11] However, by using weights, I find very similar age-consumption profiles and, therefore they are not reported here.

Figure 1

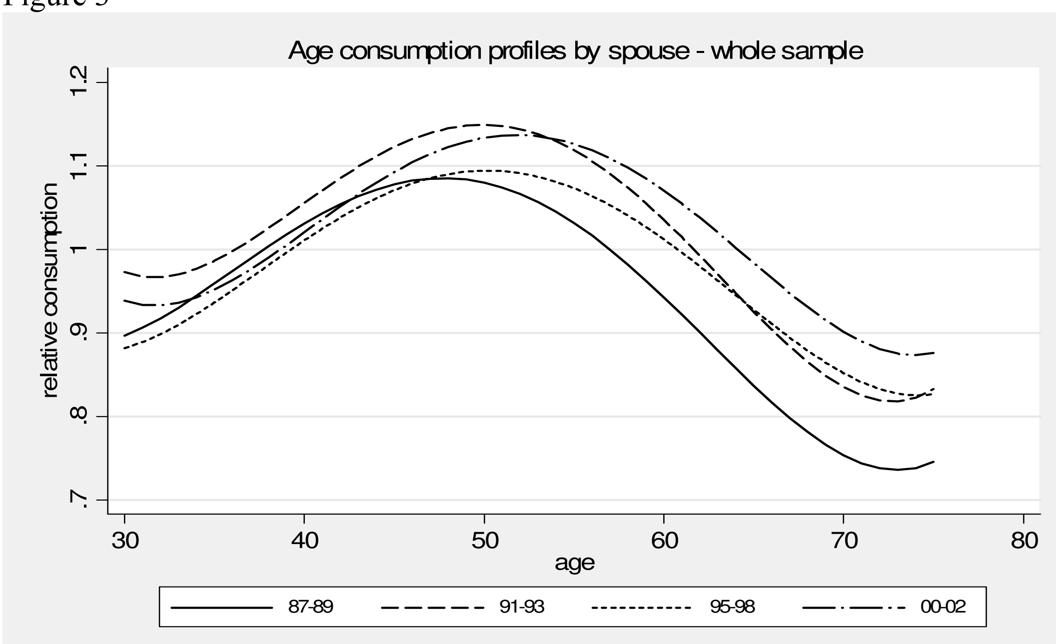
Figure 2

Figures 1 and 2 confirm that the age-consumption profile shifted substantially over time. The profiles of each time period often cross each other implying a significant change in the slope of the profile itself. This contradicts the altruism hypothesis. In

[11] The sample weights of each survey differ, even when considering the same household. Therefore, there is not clear indication of which strategy is to be preferred.

addition, both figures show an increase over time of the cohort average consumption for those aged 60 or more with respect to the average consumption of 40 years old households. The shift occurred between the late 1980s and the early 2000s. Such a result might support the idea that the implementation of the two pension reforms in the 1990s had indeed a redistributive effect from the young to the old. This conclusion is clearly in contrast with the Barro's neutrality assumption. Another approximation approach would equally impute the consumption expenditure to both the head of household and his/her spouse. In fact, it is not unusual the case of an age gap between spouses. Equally imputing consumption expenditures is quite reasonable from a theoretical perspective. It basically assumes that the spouses together constitute the household decision-making unit. This is more reasonable than assuming that all the consumption decision are taken by the head of household alone. The consumption of the children and other dependents is instead accounted as consumption of the two spouses. This consumption can be interpreted as a "gift" from the decision-makers to their dependents. Since the decision makers have a benefit from their dependents' consumption, it is consistent to impute this consumption to them. I construct then age-consumption profiles by first equally dividing household consumption between the head and his/her spouse. From each household that includes husband and wife I obtain two independent observations belonging to two different age-cohort, so increasing the quality of the approximation. Figures 3 and 4 contain the results of this approach.

Figure 3



The time periods have been grouped in pairs. Figures 3 refers to a pooled (men and women) sample, while figures 4 shows the age-consumption profiles for men only. The two figures confirm the results that I obtained when the profiles were constructed by head of household. The profiles cross each other and shift over time. Moreover, I again find evidence of an increase over time in the consumption of the elderly relative to the 40 years old age-cohort. All these findings contradict the altruism hypothesis.[12]

Figure 4

5.2) Tests based upon bi-annual changes in income and consumption

Two sets of regressions are proposed in this section. In the first set, cohort average changes are regressed on an age dummy, a time dummy and an age-time interaction dummy. The *inter-generational altruism model* predicts that, for each given time period, the age-time interaction dummies should have identical coefficient. The second set of regressions consists of a more direct test of the *equal errors proposition*. If one regresses the percentage changes of consumption on changes in income and controls for common resources shocks, then the coefficient of the percentage change in current income should not be significant. This is a test of a standard implication of the Barro's model: if households are altruistic and have an infinite horizon, then current resources should not be relevant in the consumption decisions.

[12] I also constructed age consumption profiles per adult equivalent. I assumed that people younger that 18 represent 0.7 adult equivalent and divided the household consumption by the number of adult equivalents. Given this assumption, one can compute the cohort average consumption levels by including observation for all households' members. However, this approach is not precise and, as a result, provides unreliable profiles which are not reported here. In principle, this approach should work better if only considering consumption of food (usually adult equivalent scales are based on alimentary needs). Figure 5 reports the age consumption profiles by head of household in the case of only consumption of food. The results do not vary at all. When constructed per adult equivalent, the profiles seem not reliable, so showing that the adult equivalent assumption does not work well.

5.2.1 Age-Time Interaction Dummy

[TO BE ADDED]

5.2.2 Cohort Specific Income Changes

Starting from equation (13) in the paper, one can directly test the altruism hypothesis against the life-cycle one by asking whether, in addition to age dummies and time dummies (that control for common resources shocks), cohort-specific income changes enter significantly in a regression explaining cohort average percentage changes in consumption. According to the Barro's altruism model, the time dummy is a sufficient statistics for the clan's intertemporal common resources and should be the only variable explaining changes in consumption (after controlling for the age dummy). Therefore, a not significant coefficient for the cohort-specific changes in current income would be evidence in favor of altruism. Alternatively, if current income is significant in explaining change in consumption I would have evidence supporting life-cycle model with no perfect risk-sharing.[13] The regression of my test is,

$$\overline{\Upsilon}_t^a = \overline{\psi}^a + \overline{\mu}_t + \beta \Delta Y_t^a \qquad (14)$$

where ΔY_t^a is the cohort average percentage change in current income. A significant β in equation (14) would also be compatible with a simple Keynesian model in which consumption depends only on current income. The way to discriminate between life-cycle planning and simple Keynesian model is to look at the time-dummies. Under the Keynesian model, ignoring measurement errors, only changes in current income explain changes in current consumption. As a consequence, the time-dummies should be not significant. Opposite, under the life-cycle model changes in current income do not control perfectly for the cohort's change in resources. In fact, suppose that under the life-cycle model the Euler errors of different age-cohort are correlated. In this case the time-dummies would capture the common shock component to different cohorts' Euler errors. This observation was first made by Altonji, Hayashi and Kotlikoff (1989). A summary of the predictions of each model is contained in Table 1.

Table 1. *Predictions of the models*

Model	Prediction on income coefficient	Prediction on time-dummies
Altruism	Not significant	All significant
Life Cycle	Significant	Significant or not
Keynesian Model	Significant	Not significant

[13] Notice that a non significant coefficient for current income changes would not allow to discriminate between the pure altruism model and the perfect risk-sharing life cycle model.

Table 2 reports the R-squared, the coefficients of cohort-specific income changes and their P-value for two different sets of regressions. In the first one, the regression includes time dummies so to control for common resources shocks. In the second one, time dummies are excluded. For the first set of regressions, I also report the number of time-dummies which are significant.[14] Table 2 also contains the result of the same regressions performed on different sub-samples. I identify sub-samples in two ways: by geographic area of residence and by size of the city of residence. This part of the test aims at looking for evidence of altruism in smaller samples. Eventual differences in the results of tests could also be used to verify whether there is room for an age-structure effect. In other words, if sub-samples characterized by different age-structures of the clans provide different results, then one might question the assumption that the Euler errors are not correlated with the clan's size and composition.

Table 2. *Cohort average income change coefficients*

Sample of the regressions	Regression with time-dummies				Regression without time-dummies	
	R^2	Coefficient	P>t	Time dummies*	R^2	Coefficient
Whole Sample	0.97	0.4567	0.000	3	0.89	0.9118
By areas						
North	0.94	0.3566	0.000	3	0.84	0.8824
Center	0.87	0.3663	0.000	3	0.74	0.7601
South	0.84	-0.311	0.004	6	0.59	0.7483
By city[1]						
Small Cities	0.96	0.5037	0.000	5	0.88	0.9069
Big Cities	0.91	0.4116	0.000	1	0.79	0.8533

*: Number of significant time dummies out of six

1: City of residence. The threshold to distinguish between big and small is 200,000 residents

5.2.2.1 Results on the whole sample

In the regression with the time-dummies, the coefficient of the cohort-specific income changes is significant. This already contradicts the altruism hypothesis. In addition, only three time-dummies out of seven are significant so confirming the rejection of the Barro's model for the Italian data. Recall, in fact, that if altruism holds then all the time-dummies should be significant. The point estimate of the income change coefficient is large from an economic point of view (0.4567).

[14] The sample contains 7 time periods, namely 89-87, 91-89, 93-91, 95-93, 98-95, 2000-98, 2002-2000.

This means that changes in current income explain a large part of the households' consumption decisions. The exclusion of the time-dummies from the regression does not alter the results. The coefficient of current income changes is still significant and the point estimate is bigger. The fact that three time-dummies are significant constitutes evidence in favor of the life-cycle model against the simple Keynesian model. The income change does not control perfectly for cohorts' change in resources, therefore the three dummies are capturing correlation among the Euler errors of different age-cohort in those time periods. In conclusion, the test performed on the whole sample clearly rejects the hypothesis of a systematic operative chain of inter-generational transfers and gives support to the life-cycle planning with no perfect risk-sharing.

5.2.2.2 Results on sub – samples

As mentioned above in the paper, performing the test on different sub-samples with different clans' age-structures aims at shedding light on the relevance of an *age-structure effect* when testing for altruism.

Table 2 also contains the results of the regressions performed on two sets of sub-samples, namely by area of residence (*north, center, south*) and by the size of the city of residence (*big cities and small cities*). The age-structure of the sub-samples considered here is likely to be quite different. Population studies show that in the north of Italy inter-generational family linkages are usually weaker, for people to live in smaller family groups. The second set of sub-sample distinguishes between households living in cities with less than 200,000 people and households living in cities with more than 200,000 people. The rational for this is that usually people living in big cities tend to have weaker family linkages.

In the regressions by area of residence, when time-dummies are included, the cohort-specific income changes coefficient is always significant whatever the sub-sample used. The results of the regressions for the north and the center look very similar to each other. The coefficient of income changes is positive and highly significant. Moreover, only three time-dummies out of six are significant. These results are both in contrast with the altruism hypothesis and they both comply with the life-cycle model. At the same time, the fact that three age-dummies are significant support the life-cycle model against the Keynesian model.

The regression run for the south of Italy shows different features. As already mentioned, the coefficient of cohort-specific income changes is significant. The coefficient is negative. Regardless of the sign of the coefficient, the altruism model has a clear prediction, that is the income changes coefficient should be not significant. As a consequence also the result for the south is against altruism. Moreover, six significant age-dummies clearly reject the simple Keynesian model against the life-cycle alternative. The exclusion of the time-dummies does not change the conclusions. As expected, the coefficient of cohort-specific income changes becomes even more important in explaining the changes in consumption.

The set of regression run using the partition by size of the cities of residence do not offer any different result. The cohort-specific income changes coefficient is always highly significant. Time-dummies tend also to be significant. This is once again evidence in favor of the life-cycle model against the altruism hypothesis.

In summary, the analysis performed on the sub-samples does not help to provide any evidence of different consumption behavior between the two sets of sub-groups and the whole sample. This suggests that the age-structure of the clans did not have a relevant impact in the test for altruism. A different interpretation would be that the test does not reject a null hypothesis of *no age-structure effect*. Clearly, this is not a conclusive evidence. It might be the case that an age-structure effect is relevant but the test conducted here cannot capture it. Future research will focus on finding a more specific prediction related to the age-structure of different clans.

6. Conclusions

The empirical literature on the effectiveness of fiscal policies have always rejected the altruism hypothesis for the US economy. Given the fact that the Barro's model requires strong inter-households linkages, it seems quite relevant to test the same assumption by using data from different countries which are more likely to show such strong family linkages. Italy, as other Mediterranean countries, represents an interesting case to test this model. This paper tested the altruism model for the Italian economy. The Barro's hypothesis is clearly rejected in the data. This does not imply that Italian families are not "altruistic", while it simply shows that there is no evidence of a systematic chain of intergenerational transfers. From the point of view of the effectiveness of intergenerational fiscal policies, the main results of the paper can be summarized as follows:

1. The age-consumption profiles shifted substantially from the late 1980s to the early 2000s. Under the altruism hypothesis, the age-consumption profiles should remain constant over time. This is not true in the data. Moreover, I found evidence of an increase in the consumption of the elderly and a decrease in the consumption of the young. Such a result suggests that the implementation of the pension reforms in the 1990s had a relevant redistributive effect from the young to the old. This conclusion is clearly in contrast with the Barro's neutrality assumption.[15]
2. The regression coefficient of the income changes is always significant. The coefficient is large in economic sense: current income is not only significant in explaining changes in consumption, but it also explains a large fraction of the change in consumption over two time periods.

The empirical findings of this paper, besides rejecting the altruism hypothesis, point to future streams of investigation. In particular, the observed shift over time of the age-consumption profiles calls for a deeper investigation of the Italian fiscal policies of the early 1990s and its implicit redistribution from the young to the elderly.

Moreover, it would be interesting to refine the analysis on the age-structure effect. This would allow to understand whether Italian households behave *a la* Barro even though the age-structure of their clans affects the model neutrality result of fiscal policy.

[15] While the shift in the profiles is strongly confirmed by the data, any further speculation on the impact of redistributive policies need further consideration.

Essential References

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[16] The paper is available as NBER working paper w2490 (Dec 94): "*Does the Consumption of Different Age Groups Move Together? A New Nonparametric Test of Intergenerational Altruism*". http://www.nber.org/papers/w2490